Claims

1. Method for polarizing a piezoelectric first actuator (1), especially for use in an injection valve, with the first actuator (1) consisting of a number of piezoelectric layers (11) which are arranged between two end surfaces (16, 17), with each layer (11) being arranged between two electrodes (12), with changing voltage values for polarizing the layers (11) being applied to the electrodes (12) of the layers (11), with the first actuator (1) being arranged during polarization between two retaining elements (5, 6), characterized in that
a second actuator (2) is arranged in series with the first actuator (1), that the second actuator (2) features two end surfaces(16, 17), with an end surface (16) of the first actuator having an effective connection to an end surface (17) of the second actuator (2), that a compressive stress is applied to the two actuators (1, 2) via the outer end surfaces (17, 16) through the retaining elements (5, 6), that the first and the second actuator (1, 2) are supplied for polarization with a first or with a second changing voltage, that after a start phase the voltages which are applied to the two actuators (1, 2) are defined in a manner whereby the sum of the two voltages is approximately constant over time, so that the total length of the two actuators (1, 2), despite the changes in length of the first and the second actuator (1, 2) generated by the voltages are kept approximately constant over time.

2. Method in accordance with claim 1, characterized in that the first and the second voltage switches during the polarization between minimum values and maximum values.

3. Method in accordance with one of the claims 1 or 2, characterized in that, during the start phase, the maximum value of the changing first and second voltage is increased from an initial value to an end value, and that after the start phase during the polarization of the first and/or of the second actuator (1, 2) the amplitude of the first and/or the second voltage changes cyclically between the end value and a lower value.

4. Method in accordance with claim 1, characterized in that a not yet polarized actuator is used as the second actuator (2) and thereby two actuators (1, 2) are polarized simultaneously in one polarization process.

5. Method in accordance with one of the claims 1 to 4, characterized in that the first and the second voltage have the same frequency, that the first and the second voltage are applied with phase offset to the first and the second actuator (1, 2) in such a way that after the start phase the sum of the first and the second voltage essentially remains constant.

6. Method in accordance with one of the claims 1 to 5, characterized in that voltage pulses are used in a defined polarization direction, that the first and the second actuator (1, 2) are supplied with a voltage pulse, and that the electrodes of the second or the first actuator (1, 2) are simultaneously set to a uniform potential.

7. Method in accordance with one of the claims 1 to 6, characterized in that the voltage pulses are formed in the manner such that the change over time of the voltage at the electrodes of the first actuator (1) is the same as the change over time of the voltage at the electrodes of the second actuator (2), with the voltage rising at one actuator (1) and simultaneously falling at the other actuator (2).

8. Method in accordance with one of the claims 3 to 7, characterized in that a retaining element (6) is supported to allow movement in relation to the other retaining element (5), that a change in length occurring during the start phase of the polarization process is compensated for by the first and/or of the second actuator (1, 2) by a shifting of the movable retaining element (6).

9. Device for polarizing a piezoelectric first actuator (1), with the piezoelectric first actuator (1) being tensioned between two retaining elements (5, 6) of a pretensioning holder (7), with the piezoelectric first actuator (1) being connected via control lines (10) with a control unit (9) with a pretensioning force being able to be applied to the first actuator (1) via the retaining elements (5, 6), characterized in that a second piezoelectric actuator (2) is arranged between the first actuator (1) and a retaining element (5, 6) which is connected via second control lines (21) to the control unit (9), that the control unit (9) after the start phase during the polarization process supplies the first and the second actuator (1, 2) with polarization voltages with changing amplitudes in such as

way that the length changes of the two actuators (1, 2) generated through the polarization voltages essentially balance out.

10. Device in accordance with claim 9, characterized in that a pressure sensor (19) is provided which records the pretensioning force (F) and forwards it via signal lines (20) to the control unit (9), that the control unit (9) defines the polarization voltages of the two actuators (1, 2) such that the measured pretension force (F) which acts on the two actuators (1, 2) lies within a specified range of values during the polarization.

11. Device in accordance with claim 9, characterized in that the two retaining elements (5, 6) are mounted on a housing (7), that one retaining element (6) is mounted via a motors system (8) movably on the housing (7), that the motor system (8) is connected via control leads to the control unit (9) and that the control unit (9) changes the position of the moveable retaining element (6) during the start phase, in order to compensate for the changes in length arising from the increases in amplitude of the first and the second voltage or of the first and/or of the second actuator (1, 2).